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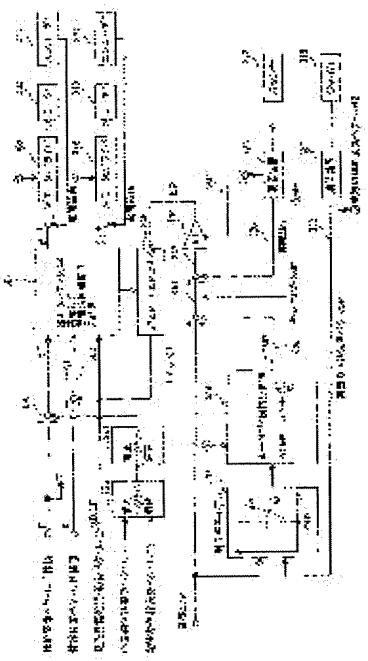
(71)Applicant : TOYOTA MOTOR CORP
(72)Inventor : YAMAMOTO TAKASHI

(54) ROBOT WALKING WHILE VARYING GAIN OF ZMP COMPENSATORY CONTROL

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a bipedal walking robot, allowed to stably walk by optimizing a gain in the case of using the so-called ZMP compensatory control in which a deviation between a target ZMP and an actual ZMP is multiplied by a gain to be converted to a trunk position correction vector, thereby controlling the target trunk position vector to be corrected, so that the robot flexibly responds to an encounter of an unexpected event to avoid falling.
SOLUTION: Corresponding to the progress of walking operation, the gain is varied. For example, the gain is increased before and after a grounding point of time of the lower limb. Or the gain is increased or decreased corresponding to the grounding force of the robot. When ZMP compensatory control is needed, the control is strongly effected, and when not needed, the control is lightly effected (hardly effected).



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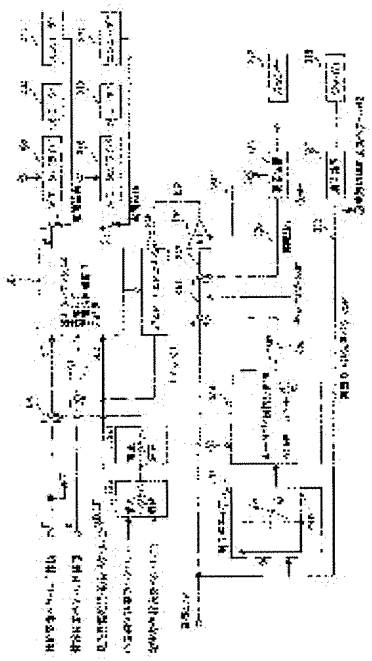
(71)Applicant : TOYOTA MOTOR CORP
(72)Inventor : YAMAMOTO TAKASHI

(54) WALKING ROBOT, LOWERING GAIN OF INVERSION PENDULUM CONTROL AT REST

(57)Abstract:
PROBLEM TO BE SOLVED: To realize a robot, walking without falling by moderately making effective "inversion pendulum control" during walking, and not causing "self-excited vibration" during resting.
SOLUTION: In performing the so-called inversion pendulum control in which a target ZMP is corrected on the basis of an angle ϕ made between a line connecting the actual trunk position of the robot and the target ZMP and a normal passing the target ZMP, during the walking operation, a large correction amount ΔZMP for the target ZMP is calculated to the angle ϕ, and during being at rest, a small correction amount ΔZMP for the target ZMP is calculated to the angle ϕ. That is, a first gain multiplying the angle ϕ and a second gain multiplying the change speed of the angle ϕ are made smaller during being at rest. Since "inversion pendulum control" is moderately made effective during walking, the robot walks without falling, and during resting, the effectiveness of "inversion pendulum control" is restrained not to cause "self-excited vibration".



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